NEW SPECIES AND A NEW GENUS OF EARTHWORMS IN THE COLLECTIONS OF THE QUEENSLAND MUSEUM (MEGASCOLECIDAE: OLIGOCHAETA)

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The present study adds to the endemic earthworm fauna of Australia (Megascolecidae), one species of the subfamily Acanthodrilinae (*Rhododrilus glandifera* sp. nov.) and nine species of the subfamily Megascolecinae, in the tribes Perionychini (*Heteroporodrilus montiserratae, Terrisswalkerius windsori, Cryptodrilus bunyaensis* spp. nov.); Dichogastrini (*Digaster lingi, D. moretonensis* spp. nov.); and Megascolecini (*Oreoscolex retrocystis* sp. nov., *Propheretima eungella* gen. et sp. nov., *Propheretima hugalli* sp. nov., and *Spenceriella conondalei* sp. nov.). *Rhododrilus glandifera* is the second species of this primarily New Zealand genus to be described from Australia (both from Queensland). It is possible that it has acquired the microscolecin arrangement of male pores (prostates one pair discharging with the vasa deferentia in XVII) from a precursor with the acanthodrilin arrangement (prostate pores 2 pairs, in XVII and XIX; male pores in XVIII) independently of the New Zealand species. Type localities of *Heteroporodrilus montiserratae, Terrisswalkerius windsori, Digaster lingi, D. moretonensis, Oreoscolex retrocystis* and *Spenceriella conondalei* are well within the ranges of their respective genera. However, the insular locality of *D. moretonensis*, on Moreton Island, is of zoogeographic interest and *Cryptodrilus bunyaensis* represents a northern extension for its genus. The new genus *Propheretima*, has been erected for species which resemble the Oriental and Australo-Papuan *Pheretima* assemblage of genera in having setae between the male pores but which are plesiomorphic in retaining the gizzard in segment V, not in the apomorphic location of VIII seen in all pheretimas. It endorses the view that the ancestry of the *Pheretima* assemblage was Australian. ☐*Rhododrilus, Heteroporodrilus, Terrisswalkerius, Cryptodrilus, Digaster, Oreoscolex, Propheretima, Spenceriella, Megascolecidae.*

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Revisionary work on megascolecid earthworms of Australia has led to recognition of ten new species in collections newly and formerly lodged in the collections of the Queensland Museum. Three of these species, in the genera *Rhododrilus, Terrisswalkerius, Digaster* and a new genus of the Megascolecini were fixed and preserved in ethanol by Mr. Keith McDonald, E. Ling and A. Hugall for cladistic studies on mitochondrial DNA which are in progress. A further species assignable to the new genus was collected by Dr. G. Dyne and Mr. A. Postle and an additional species of *Digaster*, and a species of *Spenceriella* and of *Heteroporodrilus* were lodged in the Museum collections by Dr. R. Raven and a museum group. Two species, in the genera *Oreoscolex* and *Cryptodrilus*, come from the author's collection. The type localities for the ten species range from the north of Sydney, New South Wales, to the Palmerston National Park on the Atherton Tableland in north Queensland.

Subfamily ACANTHODRILINAE

Rhododrilus glandifera sp. nov.

(Figs 1; 2A-C; 3A-F)

MATERIAL EXAMINED

HOLOTYPE: QMG211465 (Undissected).

PARATYPE: QMG211478 (P1); QMG211511 (P2; includes slide of anterior end). All specimens from 17°35'S,145°45'E., altitude 400-440m, Palmerston National Park, along track to Nandrooya Falls, Qld. Collected K. McDonald, J. Ledger, D. Ledger, Sep. 1994.

DESCRIPTION

Length 58mm, width, midclitellum, 3.2mm (Paratype 2). Segments 154 (Holotype, posterior amputee), 195 (P2). Colour pigmentless in ethanol. Prostomium not determinable. First dorsal pore 9/10 (H). Setae lumbricin, closely paired; the pairs widely separated; in XXVIII: *aa:ab:bc:cd:dd* =4.7:1:4.7:1.4:17; or 13.0:2.8:13:3.7:47.5%. Clitellum in XIII-XVII, strongly tumid, saddle-shaped with ventral margins shortly lateral of *b* lines. A pair of combined

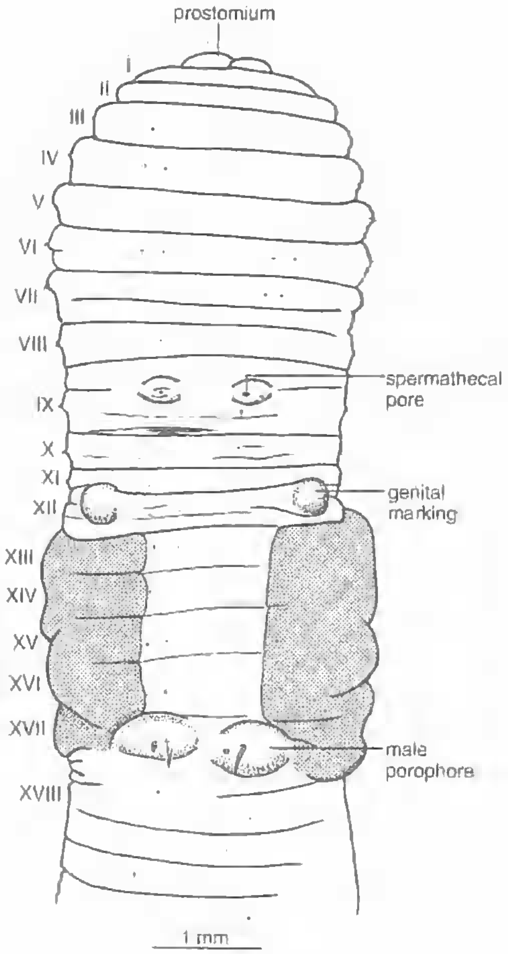

FIG. 1. *Rhododrilus glandifera* sp. nov., Holotype, QMG211465. Forebody and clitellar region.

male and prostatic pores in XVII, on indistinct oval porophores, each pore directly behind two strongly protuberant penial setae; a pair of tubular prostates visible through the body wall, winding from XVII to XXIX. Genital markings: a pair of distinct papillae in intersegmental furrow 11/12, in *bc* (holotype, paratypes aclitellate, genital markings undeveloped though penial setae protuberant to exterior). Female pores not recognizable. Spermathecal pores a single pair, in intersegmental furrow 8/9, on conspicuous papillae which extend into VIII and IX (H).

Dorsal blood vessel single, continuous onto the pharynx. Last hearts in XIII. Gizzard large, strongly muscular, in V; preceded by a wide proventriculus which is not constricted off from it. Calciferous glands: in each of the six segments X-XV there is a conspicuous pair of large, white, nacreous elongate sacs which curve upwards from the ventrolateral aspect of the oesophagus which they invest on each side to its dorsal aspect; in a cleared preparation of the anterior region of paratype 2, each is seen to have longitudinal plications in its proximal half; the glands are not effervescent in acid alcohol. Intestinal origin XVI (P1). Typhlosole not observable. Nephridia avesiculate holonephridia. Iridescent sperm funnels in X and XI; racemose seminal vesicles in IX and XII. Ovaries, with large oocytes, in XIII. Prostates a single pair, long tortuous and slenderly tubular; each with a slender, poorly demarcated duct. Penial setae present, two (H) to four (P2) projecting at each male porophore; the setae strongly curved, through at least 90°; with a pointed tip; the ectal region of the shaft with numerous palmate ectally directed scales, closely applied to the surface; length of a seta 1.9mm, measured around the curvature, or 1.3mm in a straight line from base to tip (P1). Spermathecae 1 pair, discharging anteriorly in IX; with an ovoid or somewhat clubbed ampulla and a broadly digitiform diverticulum almost as long (left) or about

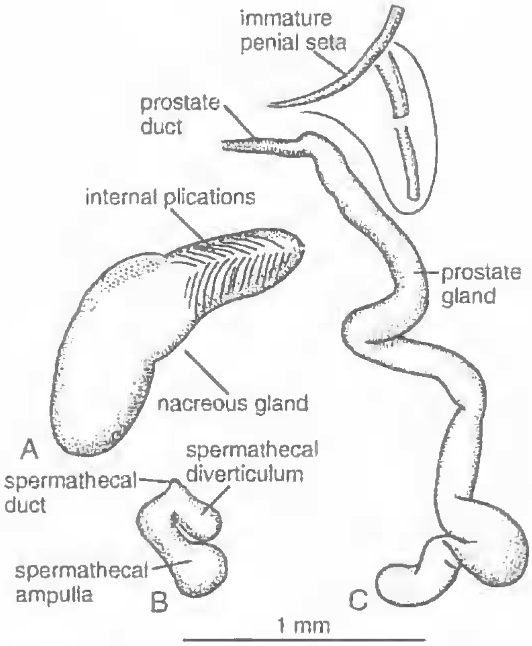

FIG. 2. *Rhododrilus glandifera* sp. nov., Paratype, QMG211478. A, nacreous gland of segment XV. B, right spermatheca; C, right prostate gland.

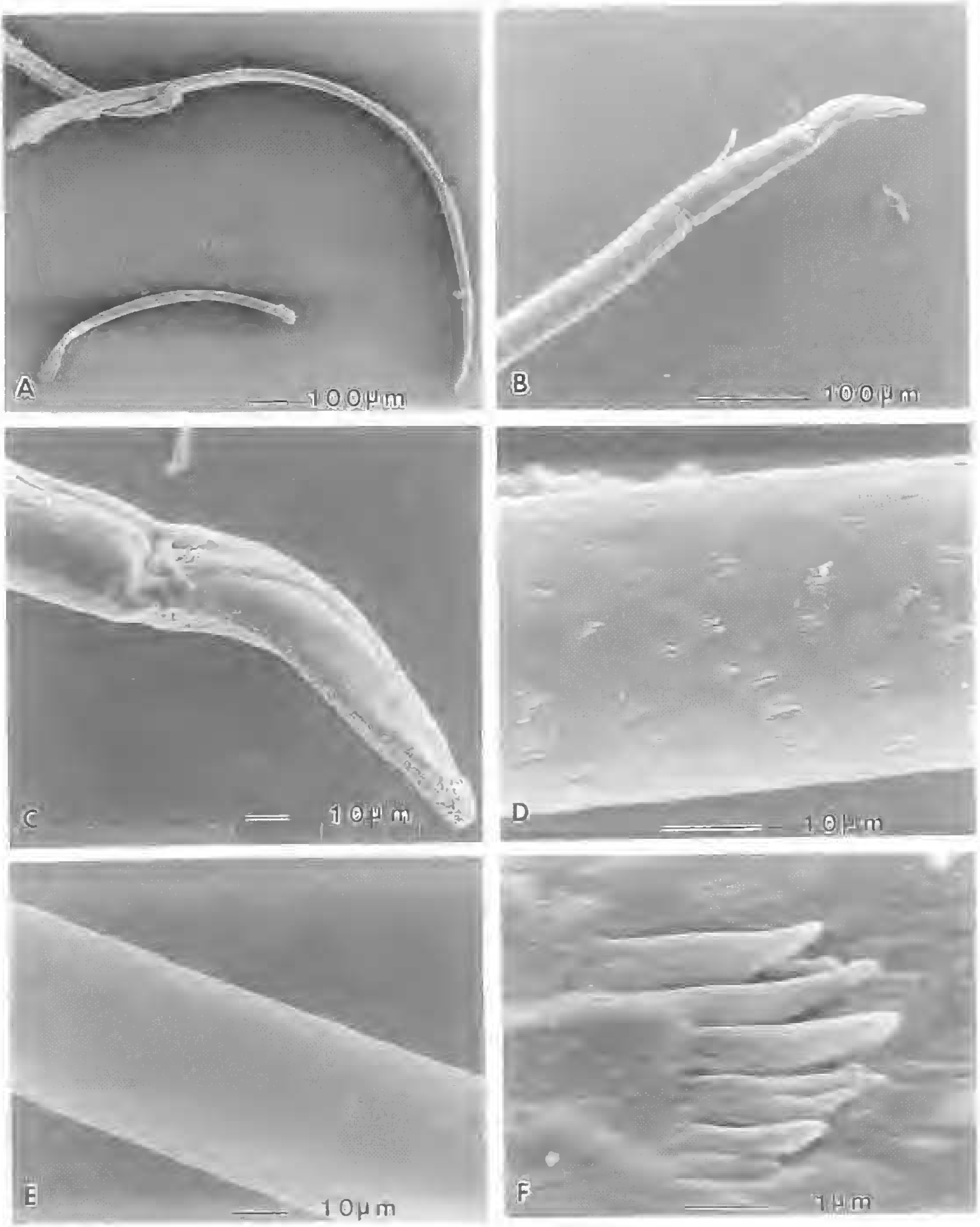

FIG. 3. *Rhododrilus glandifera* sp. nov., Paratype, QMG211478. Scanning electron micrographs of penial setae. A, a whole seta. B, ectal end. C, ectal tip. D,E, scale-like sculpturing of ectal region. F, detail of a scale.

half the length (right), converging at the pore without intervention of an appreciable duct (Pl).

ETYMOLOGY

For the highly developed nacreous glands.

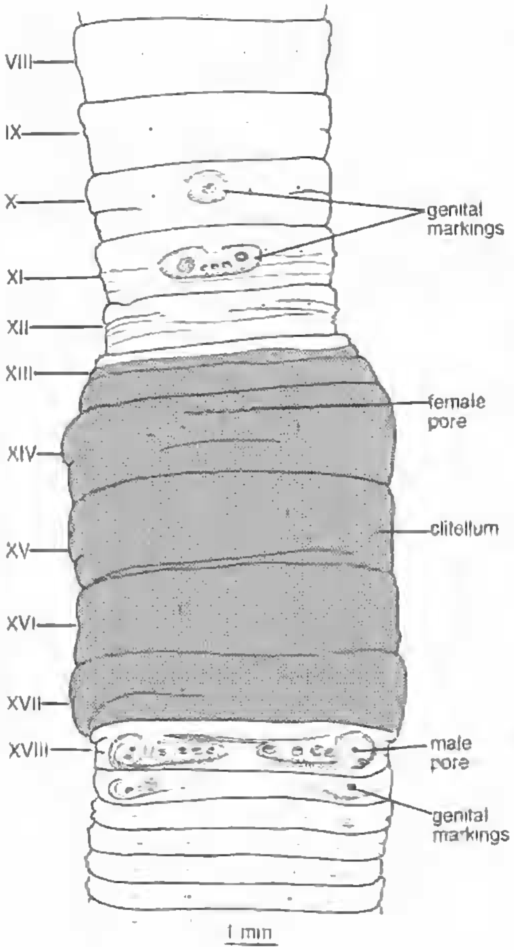

FIG. 4. *Heteroporodrilus montiserratae* sp. nov., Holotype, QMG211443, ventral view of genital field.

REMARKS

Rhododrilus was erected by Beddard (1889) for a New Zealand species, *R. minutus*. The genus was then, as it is now, definable by the combination of the microscolecin arrangement of male pores (a single pair of prostates discharging with the vasa deferentia on segment XVII) with a well developed gizzard. Later workers (Michaelsen, 1916; Lee, 1959; Dyne, 1980) raised the generic total to 31 species, all but one, *R. queenslandicus* Michaelsen, 1916, from New Zealand and neighbouring islands. The new species here described is therefore the second endemic species of *Rhododrilus* to be described from Australia, and from Queensland.

Rhododrilus glandifera differs from *R. queenslandicus* Michaelsen, 1916, in the following respects: the spermathecal pores are in intersegmental furrow 8/9, not in 7/8; and dorsal pores, accessory genital markings and nacreous (calciferous) glands are present.

Rhododrilus kermadecensis, a euryhaline species described from Tasmania by Jamieson (1974) as *R. littoralis*, differs notably from *R. glandifera* in having 2 pairs of spermathecal pores, in 7/8 and 8/9; in the different distribution of genital markings and in lacking nacreous glands; and is intermediate in the weak development of the dorsal pores.

Subfamily MEGASCOLECINAE
Tribe PERIONYCHINI
Heteroporodrilus montiserratae sp. nov.
(Figs 4, 5, 6)

MATERIAL EXAMINED

HOLOTYPE: QMG211443 (EX G10311).

PARATYPE: QMG211444 (EX G10311). All specimens from 27°57'S, 152°21'E., Mistake Mtns, N. of Cunningham's Gap, Qld., under rocks in complex notophyll vine forest. Collected R. Raven, 6 Oct. 1976.

DESCRIPTION

Length 76mm in the paratype (P); the holotype (H) is a posterior amputee. Width 5.0 (P), 6.4mm (H), segments 217 (P). Pigmentless in ethanol. Prostomium tanylobous, with a transverse furrow at midlength; neither it nor the body canaliculate; peristomium short. First dorsal pore 5/6. Setae *aa:ab:bc:cd:dd* = 2.4:1:2.0:1.7:4.6; or 14.5:6.1:12:10.6:27.9% (H); in regular longitudinal rows throughout. Nephropores visible as mostly conspicuous dimpling of the intersegments, in the holotype in *d* lines in II-IV; in *c* lines in V and VI, in *c* lines (left) and *d* lines (right) in VII, in VIII-X alternating from *d* to *c* (left) or the reverse (right); in XI and posteriorly, alternation is regular between *d* and *b*, though out of phase on the two sides. Clitellum annular, embracing the posterior 2/3 of XIII-XVII, and dorsally the anterior 1/4 of XVIII; strongly tumid in XIV-XVII. Combined male and prostatic pores each a small dark point at the site of the absent setae b of XVIII, on indistinct round papillae which fill most of the posterior two thirds of the segment (H); the male field is damaged and not clearly discernible in the paratype. Anterior genital markings in X and XI (H, P); consisting of a low, midventral mostly presetal papilla with pore-like centre in X, and a transverse midventral pad in the setal arc of XI, bearing a pair of pore-like

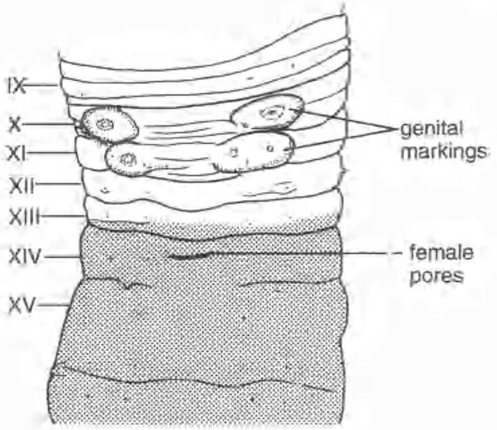

FIG. 5. *Heteroporodrilus montiserratae* sp. nov., Paratype 1, QMG211444, showing genital markings differing from those of the holotype though in the same segmental location. Scale as Fig.4.

markings near its lateral borders and three minute indistinct 'pores' near its posterior border (H); or (P) a pair of transversely elliptical papillae in *ab* of X and XI but less far apart in XI, each pair almost filling its segment longitudinally and with a pore-like centre or (left posterior papilla) with two smaller pore-like markings. Posterior genital markings (H) a narrow, slightly tumid transverse band in the setal arc median to each male papillae, each band with a row of four elliptical pore-like markings, in XVIII; in XIX a tumid area on each side which includes the seta *b* of its side but does not reach the anterior and posterior borders of the segment (H). Female pores a pair of minute apertures in a transverse furrow midway between the setal arc and the anterior border of XIV, almost 1/2*aa*, 1.0mm, apart. Spermathecal pores 3 pairs, not externally visible, from internal examination in 6/7, 7/8 and 8/9, the last pair in *ab*.

Septa 8/9-10/11 the strongest, greatly thickened. Dorsal blood vessel single, continuous onto the pharynx. Last hearts in XIII, those in X-XIII latero-oesophageal. Gizzard very large, in V, ensheathed by the very thin septum 5/6 and deflecting several septa posteriorly. Calciferous glands 4 pairs, in X-XIII, sessile ventrolaterally on the oesophagus and almost meeting midventrally. Intestine commencing with abrupt expansion in XV; with no appreciable typhlosole (H, P). Nephridia stomate vesiculate holonephridia; pretesticular nephridia have wide convoluted ducts each with a terminal swelling constituting a small but definite bladder; by XII the bladder, laterally situated, is very large and depressed subspheroidal; in the anterior intestinal region, e.g. XVII, the bladder is slightly smaller and is transversely elliptical; further posteriorly (XXXV) the bladder is drawn out medianly in the direction of its supplying duct and projects laterally beyond its excretory pore so that a short broad diverticulum may be considered to exist. Holandric; convoluted sperm funnels, lacking spermatozoal iridescence, in X and XI. Seminal vesicles in IX and XII; those in XII more strongly multiloculate, including a greater development of minute bead-like loculi than those in IX. Ovaries a few short egg strings, in XIII. Prostates racemose and deeply incised; in the holotype with some appearance of a compressed S-shape; limited to XVIII; duct long and muscular, although only a small fraction of the length of the gland; twisted in a loop; entering the body wall in *ab* but nearer *b* (H, P). Spermathecae 3 pairs, in VII, VIII and IX; each with a large thin walled ampulla, which is widest distal to its equator and is circumferentially pleated, and a very small, narrow muscular duct which is joined at its junction with the am-

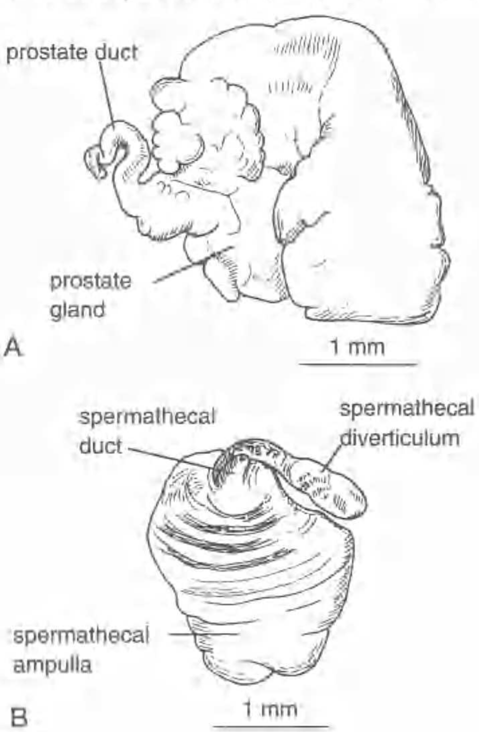

FIG. 6. *Heteroporodrilus montiserratae* sp. nov., Holotype, QMG211443. A, right prostate gland. B, right spermatheca of segment IX.

pulla by a digitiform uniloculate diverticulum containing many iridescent sperm masses (H, P).

ETYMOLOGY

Refers to the type locality Mistake Mountains.

REMARKS

Heteroporodrilus montiserratae is distinguished from other species of the genus in possessing four pairs of calciferous glands and three pairs of spermathecae.

Terrisswalkerius Jamieson, 1994

The key to species given by Jamieson (1994) is emended below to accommodate the new species, *T. windsori*, and to acknowledge the presence of five pairs of spermathecae and their pores in *T. millaamillaa* which has been established in the present study in a re-examination of the holotype.

KEY TO THE SPECIES OF *TERRISSWALKERIUS*

1. Spermathecal pores 5 pairs, in or shortly behind intersegmental furrows 4/5-8/9 2
   Spermathecal pores 1 to 4 pairs (rarely unpaired, midventral), in or shortly behind some or all of intersegmental furrows 4/5-8/9 5

Spermathecal pores 5 pairs

2. Spermathecal pores in *a* lines. Last hearts in XIII. (Spermathecal duct very short.) . . . *T. grandis*
   Spermathecal pores median to *a* lines. Last hearts in XII. (Spermathecal duct at least one fourth the length of the ampulla) 3

3. Nephridial bladders absent 4
   Nephridial bladders present . . . . . . *T. atavius*

4. Male pores well median of *a* lines. Moderately small worms <3mm wide . . . *T. millaamillaa*
   Male pores in setal lines *a* or *ab*. Fairly large worms >6mm wide . . . . *T. phalacrus*

5. Spermathecal pores in 4 intersegments, 5/6-8/9 or 4/5-7/8, paired or single 6
   Spermathecal pores 3 pairs or fewer 9

Spermathecal pores in 4 intersegments

6. Spermathecal pores in 5/6-8/9, unpaired, midventral . . . . *T. macdonaldi*
   Spermathecal pores 4 pairs, in 4/5-7/8 or 5/6-8/9 7

7. Spermathecal pores 4 pairs, in 4/5-7/8 . . . . *T. terrareginae*
   Spermathecal pores 4 pairs, in 5/6-8/9 8

8. Prostomium tanylobous, with wide dorsal tongue. (Peristomium short). Nephropores in a straight series on each side . . . . *T. erici*
   Prostomium epilobous or proepilobous; with longitudinal grooves which continue to the hind margin of the peristomium. Nephropores in an irregularly sinuous series, varying from far dorsally to far ventrally, on each side . . . . *T. kuranda*

9. Spermathecal pores 3 pairs, in or in or shortly behind 4/5-6/7, 5/6-7/8, or 6/7-8/9 10
   Spermathecal pores 1 or 2 pairs, in some of 4/5-8/9 16

Spermathecal pores 3 pairs

10. Spermathecal pores 3 pairs, in 4/5-6/7 11
    Spermathecal pores 3 pairs, in or shortly behind 5/6-7/8 or 6/7-8/9 13

11. Spermathecal diverticulum long and tortuous. Spermathecal pores in the vicinity of *d* to *e* lines 12
    Spermathecal diverticulum short and clavate Spermathecal pores in or between *a* and *b* lines . . . . *T. montislewisi* (part)

12. Spermathecal diverticulum longer than ampulla plus duct. (Spermathecal pores in *d* lines) . . . . *T. barronensis*
    Spermathecal diverticulum shorter than ampulla plus duct. (Spermathecal pores in *d-e* lines) . . . . *T. raveni*

13. Spermathecal pores immediately behind 5/6-7/8 . . . . *T. covacevichae*
    Spermathecal pores in 6/7-8/9 14

14. Male pores very close together, almost contiguous midventrally, on a common field or papilla . . . . *T. athertonensis*
    Male pores well separated, between setal lines *b* and *f*, on a pair of papillae 15

15. Spermathecal diverticulum simple, shortly clavate . . . . *T. canaliculatus*
    Spermathecal diverticulum composite, consisting of as many as 4 parallel conjoined tubes with terminal, knoblike seminal chambers; approximately as long as the spermatheca . . . . *T. oculatus*

16. Spermathecal pores 2 pairs, in 4/5 and 5/6 or 5/6 and 6/7 17
    Spermathecal pores 1 pair, in 6/7 or 7/8 or 8/9 18

Spermathecal pores 2 pairs

17. Spermathecal pores 2 pairs, in 5/6 and 6/7 . . . . *T. montislewisi* (part)
    Spermathecal pores 2 pairs, in 4/5 and 5/6 . . . . *T. windsori*

Spermathecal pores 1 pair

18. Spermathecal pores 1 pair, in or shortly posterior to 8/9. Spermathecal diverticulum long and tortuous 19
Spermathecal pores 1 pair, in 6/7 or 7/8 . . . 20
19. Spermathecal pores in setal lines *c* to *d* . . . . *T. nashi*
Spermathecal pores well median of setal lines *a* . . . . *T. liber*
20. Spermathecal pores 1 pair in 6/7 . . . *T. crateris*
Spermathecal pores in 7/8 . . . . . . *T. blounti*

Terrisswalkerius windsori sp. nov.
(Figs 7, 8)

MATERIAL EXAMINED

HOLOTYPE: QMG211466 (Clitellate, posterior amputee).

PARATYPES: QMG211457 (P1, aclitellate, intact; P2-4, clitellate posterior amputees). All specimens from 16°15'S, 145°02'E, Windsor Tableland, but site altitude 1060-1080m, Qld. Collected K. McDonald, 27 Mar 1993.

DESCRIPTION

Length 155mm. Width (midclitellar) 7mm. Segments 266 (P1). Pigmentless in alcohol. Prostomium pro-epilobous, strongly canaliculate. Peristomium very short, bisected dorsally and ventrally. Body weakly canaliculate dorsally. First dorsal pore 5/6 (H, P1). Setae minute and difficult to discern; dorsal interval (*zz*) narrow and similar to adjacent intervals; ventral interval (*aa*) about 3-4 *ab*, throughout; approximately 36 or 48 setae in XII (H, P1). Nephropores in a straight series on each side, slightly lateral of middorsum in the forebody, though near midventral in segment II; dorsolateral in the hind body. Clitellum annular, XIV-1/2XVIII but extending to 18/19 immediately lateral of the male porophores. Male pores (H, P2-4) minute orifices on small elliptical porophores in the setal arc of XVIII in setal lines *d-e*, each preceded and succeeded by a large crescentic swelling which constitute a larger porophore which protrudes slightly into the adjacent segments, XVII and XIX. Genital markings absent. Female pores not visible but presumably paired in the transverse furrow situated anteriorly in XIV. Spermathecal pores 2 pairs, in 4/5 and 5/6, dorsolateral, in setal lines 11-12 (H).

Septa 7/8 - 10/11 greatly thickened and funnel-shaped. Dorsal blood vessel single, continuous onto the pharynx. Last hearts in XIII, latero-oesophageal, like the preceding hearts, slender. Gizzard in VI, large, strongly muscular, almost

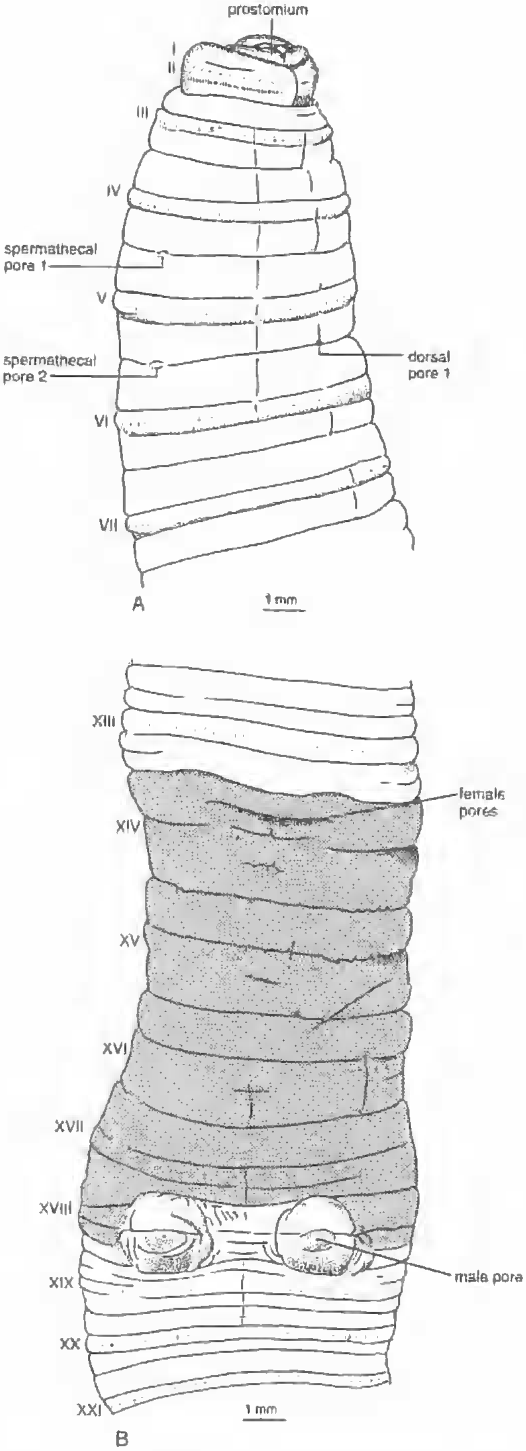

FIG. 7. *Terrisswalkerius windsori* sp. nov., Holotype, QMG211466. A, dorsolateral view of anterior end. B, ventral view of male genital field.

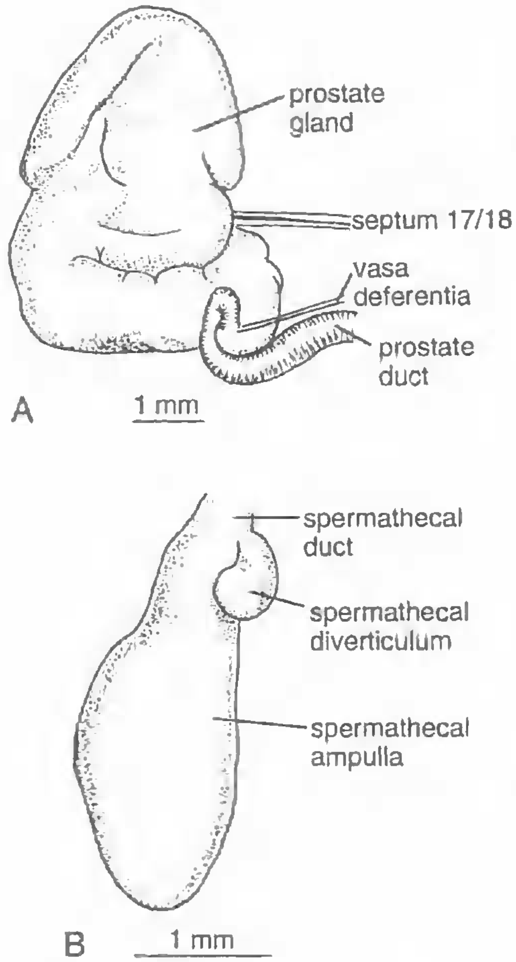

FIG. 8. *Terrisswalkerius windsori* sp. nov., Holotype, QMG211466. A, right prostate. B, right posterior spermatheca.

globose but its anterior limit straight sided. Calciferous glands and oesophageal dilatations absent. Intestinal origin XVII. Typhlosole absent. Nephridia stomate, vesiculate holonephridia; Those in II large and very complexly tufted and with elongate bladder opening anteriorly near the midventral line; those in III and IV with bladders apposed to those of II but progressively more dorsal and, though tufted, smaller; those in V and VI with very long ectally tapering bladders, lacking diverticula, discharging approximately in line with the spermathecae and compactly tufted; the duct joins the bladder slightly subterminally in anterior segments but with no true diverticulum. Nephridia not visible in VII - XI; in XII with very elongate bladder; by XV bladders are sessile subspheroidal, with duct entering subterminally. Large, nacreous, free male funnels in X and XI. Seminal vesicles large and racemose on the anterior face of XII and small and smoothly subspheroidal (pseudovesicles?) on anterior face of X. Ovaries delicate laminae of oocytes, in XIII. Prostates tubuloracemose; in the holotype dorsoventrally depressed thick plates which are resolvable into a tortuous structure; duct coiled and muscular, joined entally by the vasa deferentia; in one paratype, however, the prostates projecting at the amputated end are coiled tubes much as in *T. nashi*. Spermathecae 2 pairs, each with elongate ovoid ampulla the tapering distal portion of which is joined near its ectal end by a clavate diverticulum which is about one fourth of the length of the spermatheca and ectal to which is a very short common duct.

ETYMOLOGY

For the Windsor Tableland.

REMARKS

Only *Terrisswalkerius montislewisi* resembles *T. windsori* in having (as a variant in the former) two pairs of spermathecal pores but *T. windsori* is unique in the genus in the dorsolateral location of the pores and in presence of the first pair in intersegmental furrow 4/5 rather than 5/6.

In view of variation from two to three pairs of spermathecae in *T. lewisi*, it is appropriate to make comparison between *T. windsori* and species with three pairs of pores. Of these, both *T. raveni* and *T. barronensis* have spermathecal pores far separated from the ventral midline (in *d* or *d-e* lines) but only *T. raveni* has short spermathecal diverticula as in *T. windsori*. It also has large male porophores and the intestinal origin in XVII as in *T. windsori* but it differs in having more numerous setae, in location of the last hearts in XII (not XIII), in possessing true nephridial diverticula, and four pairs of seminal vesicles. The male porphores of *T. windsori* are also distinctive in form.

Observed variation in the apperance of the prostates, from a plate-like, albeit composite, mass to a coiled tubular form is unusual and suggests that the appearance of prostate glands is considerably influenced by the conditions of fixation.

Tribe DICHOGASTRINI

Cryptodrilus bunyaensis sp. nov.

(Figs 9, 10)

MATERIAL EXAMINED

HOLOTYPE: QMG211508.

PARATYPES: 10 examined for distribution of genital markings, QMG211509; 63 additional paratypes, Q M G211510. All types clitellate. All specimens from 26°57'S, 151°35'E, red soil under leaf litter in *Araucaria bidwilli* forest, Bunya Mts. National Park, Qld. Collected B.G.M. Jamieson, E. Bradbury, 17 Mar. 1971.

DESCRIPTION

Length 76mm, width (midclitellar) 3.5mm. Segments 185 (Holotype). Colour pigmented light brown with dark reddish brown clitellum, in ethanol. Prostomium very small, tanylobous, though crossed by a transverse furrow behind its midlength; peristomium very short and prostomium not or only partly visible dorsally; peristomium not demarcated from first setigerous segment (II) ventrally and only by an indistinct transverse groove dorsally to which the dorsal tongue of the prostomium extends. First dorsal pore 9/10 but dorsal pores indistinct. Setae 8 per segment, black and distinctly visible, in regular longitudinal rows; *ab* moderately closely paired but *cd* widely spaced, *c* being lateral and *d* far dorsal; *aa*:*ab*:*bc*:*cd*:*dd* = 2.7: 1.0: 3.4: 2.3: 5.1; or 12.7:4.7:16.0:10.8:24%. Clitellum saddle-shaped, in XIII-XVIII: intersegmental furrows 12/13 and 18/19 well developed but the intervening intersegments indicated weakly and ventrally only. Male pores in XVIII; minute pores with thin lips, in *ab*, these setae being absent, each pore in a glandular depression the slightly raised oval margins of which extend median of *a* lines and lateral of *b* lines. Genital markings paired "eye-like" medianly conjoined oval markings with presetal porelike depression in *ab*, the markings situated in XI, XII, XV-XVII, XX and XXI; the posterior limit of each marking in XI, XII XX and XXI shortly behind setae *ab*; but in XV, XVI and XVII, like the field in XVIII, reaching the posterior border of the segment. Ten paratypes were examined for distribution of genital markings; they resembled the holotype exactly with the exception that one specimen lacked the markings in XI and XII; one lacked those in XII; and all but three specimens lacked the markings in XXI; of the 10 paratypes, in one the marking in XI was unilateral left, and in another the marking in XXI was unilateral right. Female pores minute each with a weak oval field, far apart, shortly anteromedian of setae *a* of XIV. Spermathecal pores 2 pairs, minute and indistinct, on small oval papillae at the anterior margins of VIII and IX which deflect intersegmental furrows 7/8 and 8/9 anteriorly in their vicinity.

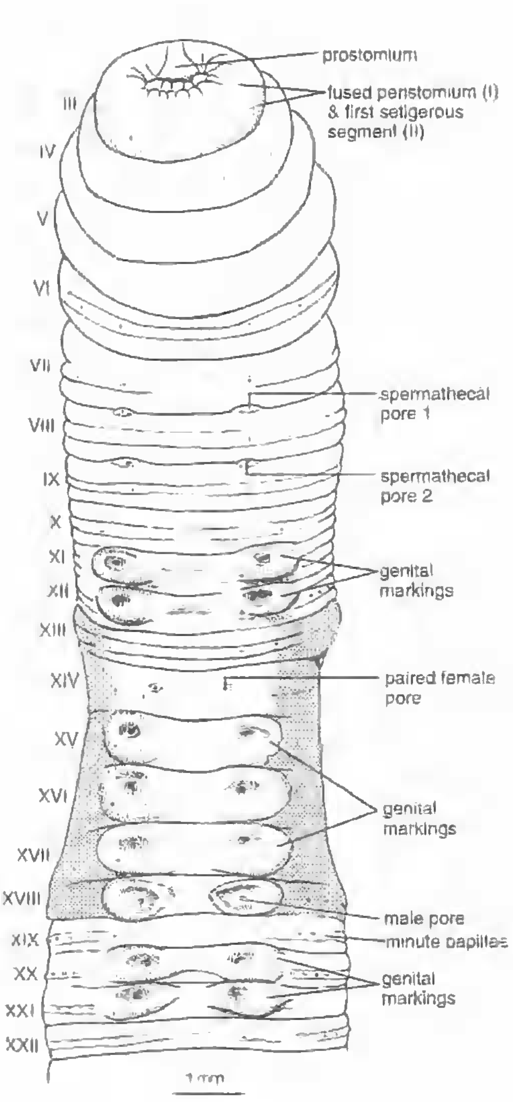

FIG. 9. *Cryptodrilus bunyaensis* sp. nov., Holotype, QMG211508. Ventral view of forebody and clitellar region.

Dorsal blood vessel continuous onto the pharynx. Last hearts in XII. Gizzard large, broad, cylindroid in V, with conspicuous anterior rim which is continuous with a thinner walled proventriculus lying in IV. Oesophagus with paired lateral dilatations in VIII-XIV; those in XXIV

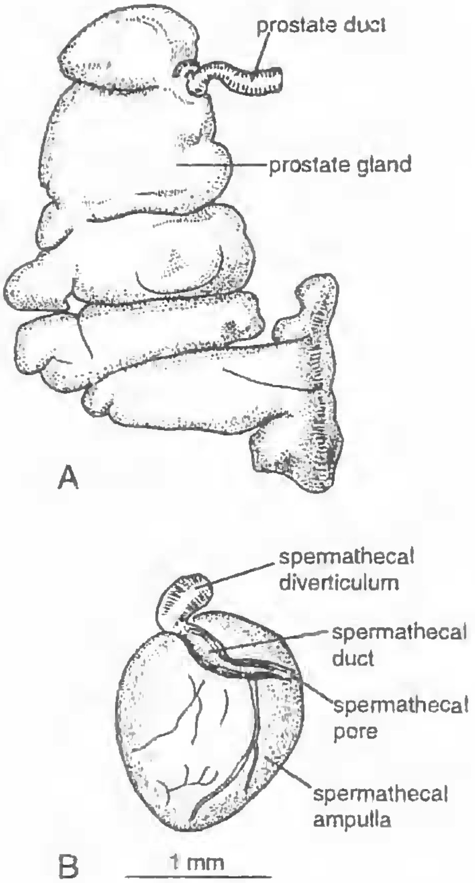

FIG. 10. *Cryptodrilus bunyaensis* sp. nov., Holotype, QMG211508. A, ventral view of right prostate gland. B, ventral view of right spermatheca.

forming true extramural calciferous glands with internal lamellae; but only those of XII and XIII constricted off from the oesophagus; best developed in XIII where they are reniform. Intestinal origin abrupt, in XVI. Typhlosole absent. Nephridia in the anteriormost segments several contorted, and sometimes almost tufted, large meronephridia on each side but none found to be enteronephric. In the anterior intestinal region, shortly behind the prostates, three large megameronephridia on each side with slender exonephric ducts entering the body wall in setal lines *b*, *bc* (nearer *c*) and in *d*; caudally, the largest nephridium, discharging in *b* line, has a large preseptal funnel and is thus a stomate megameronephridium; no enteronephry demonstrable. Holandric; testes and funnels not certainly demonstrated but free coagulum (putative sperm masses) in X and XI; and seminal vesicles, racemose with many berry-like loculi, in IX, XI and XII. Ovaries large masses of many oocytes, in XIII. Prostates elongated through several segments, broad and racemose; each with a slender convoluted duct about one fifth the length of the gland. Spermathecae 2 pairs, in VIII and IX; each with a large ovoid ampulla, a slender duct a little more than half the length of the ampulla, and a short, digitiform diverticulum, with spermatozoal iridescence, sessile at the junction of the two.

ETYMOLOGY

For the Bunya Mountains.

REMARKS

Cryptodrilus bunyanensis resembles *C. mediocris* Fletcher, from New South Wales, in loss of the intersegmental furrow between the peristomium and the first setigerous segment. Although this feature occurs in other genera (e.g. *Digaster*), it is rare and its presence in the two *Cryptodrilus* species gives some additonal support to inclusion of the new species in the genus. It differs from *C. mediocris* in lacking nephridial bladders and from all species of the genus in the distinctive arrangement of genital markings.

Digaster lingi sp. nov.

(Figs 11, 12)

MATERIAL EXAMINED

HOLOTYPE: QMG211484 (clitellate). From ca. 28°12'.S, 153°11'E., Binna Burra, Qld., in rainforest. Collected E. Ling, M. Cunningham.

DESCRIPTION

Length (posterior amputee). Width (midclitellar) 7.2mm. Pigmentless in life. Prostomium tanylobous, with broad, posteriorly narrowing dorsal tongue. Peristomium short; not canaliculate. Forebody segments, at least from VI posteriorly, strongly biannulate; traversed by a presetal groove which is almost as pronounced as the deep intersegmental furrow; postclitellar segments at first biannulate, becoming weakly triannulate. First dorsal pore 4/5. Setae small and, especially the lateral pair, difficult to discern; both pairs moderately closely paired; in XIV, *aa*:*ab*:*bc*:*cd* = 2:1:2.8:1. Clitellum annular, strongly protuberant, but weaker midventrally; dorsally XIII-XVIII, ventrally XIII-2/3XVIII; setae visible, intersegmental furrows largely obscured; dorsal pores suppressed. Male pores a pair of thin, transversely extensive slits in XVIII on a pair of low but large, transversely oval papillae which extend from *a* lines into *bc* (relative to adjacent segments; setae *a* and *b* absent in this segment. Genital markings: a slightly tumid elliptical area fills the region between the male porophores from the posterior limit of the setal annulus of XVII to the anterior limit of that of XIX interrupting the clitellum ventrally; it bears a pair of well defined oval depressions at the site of intersegmental furrow 18/19 which is suppressed on the tumid area. Female pores inconspicuous, anteromedian to setae *a* of XIV, in a transverse slit. Spermathecal pores 2 pairs, in intersegmental furrows 7/8 and 8/9, in *a* lines, small, and visible only when the intersegment is parted.

Septa 7/8-11/12 very strongly thickened, especially 8/9-10/11. Dorsal blood vessel single, continuous onto the pharynx. Last hearts very large, in XII; those in X-XII latero-oesophageal but only those in XII shown to have (thin) connectives to the dorsal vessel. Two moderately large, subspheroidal muscular gizzards, in VI and VII, separated by a thin-walled proventriculus-like region. Oesophagus vascular but lacking calciferous glands; strongly dilated and intestine-like in XIV. Intestinal origin XVIII. Nephridia (caudal region of body not available) stomate, avesiculate micromeronephridia; in the vicinity of the prostates on each side there is a ventral convoluted nephridial mass lateral to which are about 10 small nephridia in transverse single file, each with a long, thin ectal duct, egress of the ducts at the body wall scattered between the anterior and posterior limits of the segment. Testes? and nacreous funnels in X and XI, the posterior pair better developed. Seminal vesicles racemose, in IX and XII, the latter pair the larger. Ovaries represented by many thin, empty strands. Prostates large racemose, flattened discs, each with a short muscular ectal duct, in XVIII. Spermathecae 2 pairs, in VIII and IX, each with an ovoid ampulla and a shorter duct which is joined ectally by a small, rounded and apparently pluriloculate diverticulum.

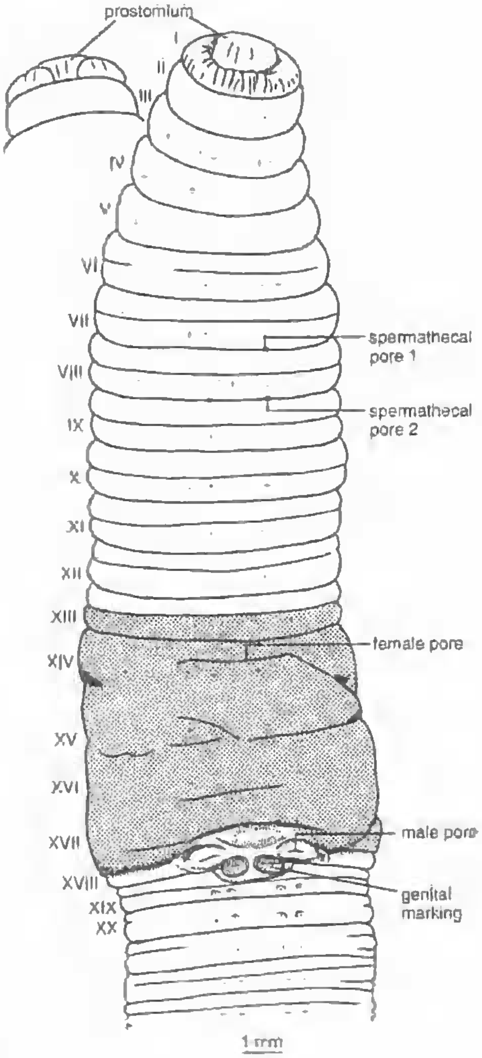

FIG. 11. *Digaster lingi* sp. nov., Holotype, QMG211484. A, dorsal view of anterior end showing prostomium. B, ventral view of forebody and clitellar region.

ETYMOLOGY

For Edmund Ling who collected the specimen.

REMARKS

Three species of *Digaster*, *D. gwongorellae*, *D. minor*, and *D. moretonensis*, in addition to *D. lingi*, have a midventral circular, oval or almost bifid pad or tumid area on XVIII between or including the male pores. *D. lingi* differs from all three in having genital markings at 18/19 and differs further from *D. gwongorellae* and *D. moretonensis* in having paired female pores. *D. lingi* also differs from *D. minor* in having the lateral setal couples about as wide as, rather than twice as wide as, the ventral couples. *D. lingi* further differs from *D. moretonensis*, among other respects, in the absence of genital markings on segments XIX to XXIII and the much shorter

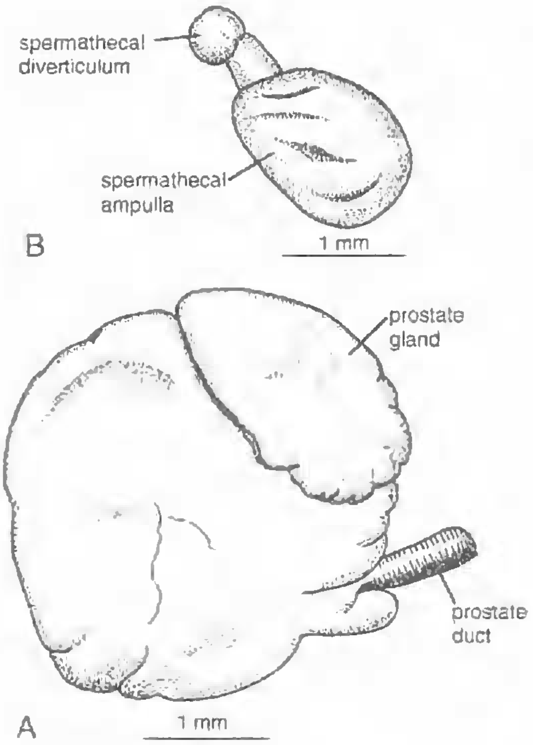

FIG. 12 *Digaster lingi* sp. nov., Holotype, QMG211484. A, left prostate gland. B, right posterior spermatheca.

clitellum which extends to XX in *D. moretonensis*.

Digaster moretonensis sp. nov.
(Figs 13)

MATERIAL EXAMINED

HOLOTYPE: QMGH1445.
PARATYPE: QMGH1444. Both from 27°11'S, 153°24'E, Moreton Island, Eager's Swamp, pitfall trap, Qld. Collected Queensland Museum Party, 22 Sep 1982.

DESCRIPTION

Length 190 (P)-205 (H) mm, width 9.8mm (H)-11mm (P). Segments 218(H). Pigmentless in alcohol with light chocolate brown clitellum. Prostomium prolobous; it and the peristomium with several parallel longitudinal dorsal furrows. First dorsal pore well developed, at 5/6 (H, P). Setae minute; in holotype and paratype arrangement not certainly determinable in the forebody; but shortly behind the male pores four pairs, *ab* closely paired; *cd* slightly more widely paired; *c* and especially *d* lines irregular; *dd* = 0.5*u*. Clitellum from presetal XIII-XX ventrally, to XXI dorsally; a posteriorly widening median strip is aclitellate in XVII posteriad and is pale and possibly interrupted in XV-XVI, and paler, though complete, in XIV, annular but weaker and less pigmented in XIII. Male pores a pair, minute, lacking definite porophores, equatorial in XVIII, in *ab*, in a non-glandular patch which extends laterally beyond *b* lines relative to adjacent segments, setae *ab* being absent in this segment. Accessory genital markings (H only) midventral pale brown transverse oval patches, including the ventral pairs of setae, in XX-XXIII, best developed in their postsetal portions. Female pore single, slightly displaced to the right (H) or midventral (P). A midventral pore presetal in XIII (H) also, in a glandular craterlike elliptical field (indicated as a genital marking in Fig. 13A). Spermathecal pores 2 pairs, in 7/8 and 8/9, very slightly median of *a* lines; those in 8/9 2.0mm apart.

Dorsal blood vessel single, continuous onto the pharynx. Last hearts in XII; those in X-XII large, tortuous and latero-oesophageal. Two very large globular gizzards, in VI and VII, with a very short non-muscular zone between; calciferous glands absent; intestine commencing with abrupt expansion in XVIII but septum 17/18 pressed forward into XVII. Small, nacreous, free sperm funnels in X and XI; small, compact racemose seminal vesicles in XI and XII. Nephridia numerous avesiculate micromeronephridia observed in midbody in segments in the vicinity of prostates. No buccopharyngeal enteronephry observed. Caudally, the medianmost nephridium greatly enlarged as a megameronephridium with preseptal funnel. Ovaries with many chains of small oocytes, and large funnels, in XIII. Ovisacs absent. Prostates racemose, each a rectangular lobe in XVIII with its anterior (ental) end reaching posterior XVI. Duct almost as long as the gland, curved mediad and widened ectally. The duct with three median diverticula of which the largest is about half the length of the duct, the shortest (anterior) almost subspheroidal, and the third intermediate in length. Vasa deferentia not observed. Penial setae absent. Spermathecae 2 pairs, in VIII and IX, each with an ovoid ampulla, broad, poorly demarcated ectally tapering duct, and multiloculate diverticulum on the dorsoanterior aspect of the ectal end of the duct.

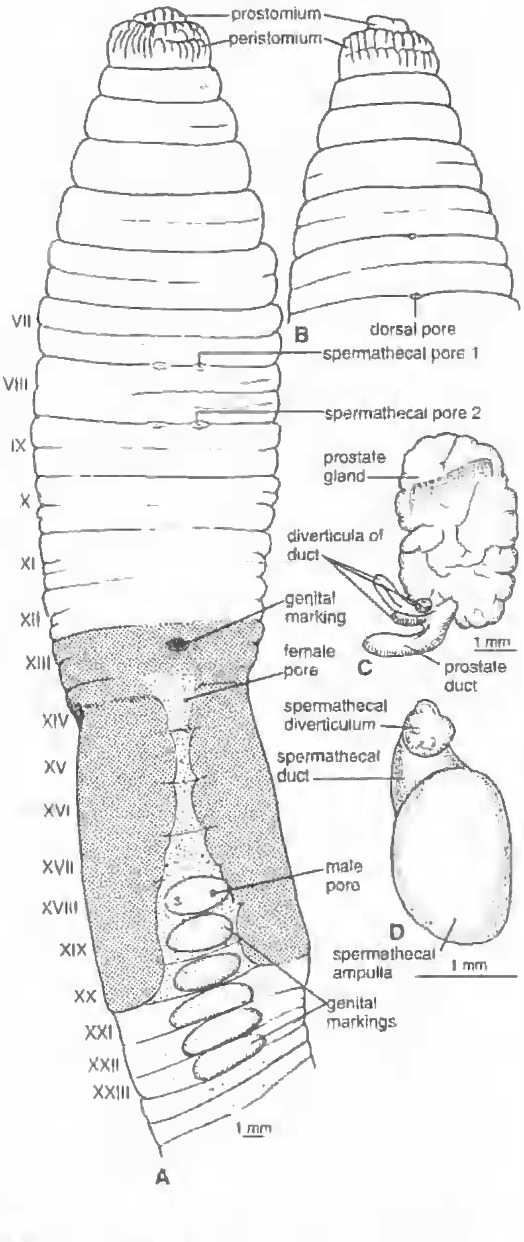

FIG. 13. *Digaster moretonensis* sp. nov., Holotype, QMGH1445. A, ventral view of forebody and clitellar region. B, dorsal view of anterior end. C, right prostate gland. D, right posterior spermatheca.

ETYMOLOGY

Named after Moreton Island, the type-locality.

REMARKS

D. moretonensis is distinguished from other species of the genus by a combination of characters: the presence of midventral segmental genital markings in XVIII to XXIII, the long clitellum, extending to XX, and the unpaired, midventral or unilateral female pore. The diverticula of the prostate ducts are unknown in other oligochaetes. They possibly represent branches of the duct typical of racemose prostates, which have not developed glandular coats.

Tribe MEGASCOLECINI
Oreoscolex retrocystis sp. nov.
(Figs 14A, 15)

MATERIAL EXAMINED

HOLOTYPE: QMG211416.

PARATYPES: QMG211417-211421, all types from S.E., Galston Gorge near Sydney, N.S.W., in dark sandy soil bordered above and at the sides by large rocks, about 20 feet above the river shortly below the wooden bridge. Collected B.G.M. Jamieson, 23 May 1962.

DESCRIPTION

Lengths (3 intact paratypes) 75-86mm, mean 79.7mm. Width (segment XIV in holotype and 3 paratypes) 2.4 -3.1, mean 2.6mm. Segments 162-172, mean of 3=168. Pigmentless in ethanol. Prostomium very small, closed, epilobous 1/4 to <1/2 but may be retracted into the mouth so as to appear prolobous. First dorsal pore 10/11 (holotype and 3 paratypes) or 11/12 (1 paratype). Setae 8 per segment, in regular longitudinal rows; small but distinct on well demarcated setal annuli; in XII (H) *aa*:*ab*:*bc*:*cd*:*dd*=3.5:1:3.1:2.3:9.4; or 13.5:3.9:12.2:8.9:36.6%. Clitellum not developed in the holotype; in three paratypes, represented by slight annular tumescence and partial occlusion of dorsal pores in XIV-XVII, and dorsally in XIII; intersegmental furrows clearly defined and, in view of the maturity of the specimens, probably never obliterated by the clitellum. Male pores minute on a pair of very small papillae on XVIII, at the site of the absent setae *a*. In the holotype and the, fully mature, paratypes (QMG211417-21), accessory genital markings are very large sharply defined, raised subcircular intersegmental markings, with pore-like centres in *ab* in 16/17 and 19/20. In 16/17 they extend to the setal annuli of the two adjacent segments, where they are paired or (H and Paratype QMG211417) unilateral, right. In 19/20, they are paired (H and paratype QMG211417) or (paratypes QMG211418, 21) unilateral, right. In two specimens they are absent from 19/20 (paratypes QMG211419 and 20). The male papillae lie at the lateral extremity of a deep depres-

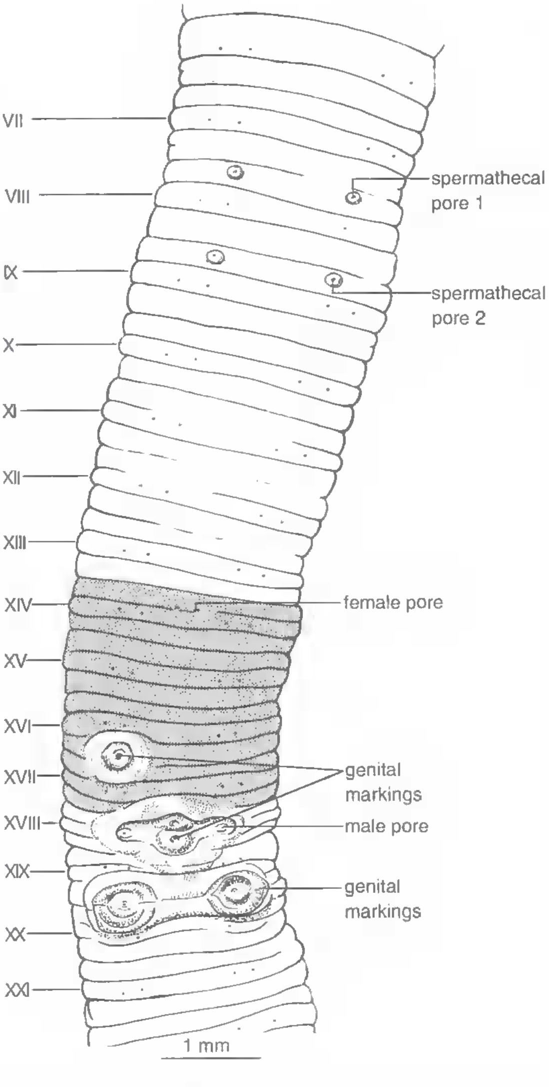

FIG. 14. *Oreoscolex retrocystis* sp. nov., Holotype, QMG211416. A, ventral surface, from the spermathecal to the male genital regions.

sion, with the form of a wide partly open mouth, the tumid lips of which are sharply defined at the inner margin, which forms parentheses closely lateral to the male papillae, and in the midline circumscribes a large median papilla and (visible in the holotype only) in front of this a small median papilla; the tumid lips extending in the midline to the setal annuli of segments XVII and XIX. Female pores minute, less than one third *aa* apart, in an inconspicuous transverse slit which coincides with the furrow anteriorly limiting the setal annulus of XIV (holotype, 1 paratype) or small gaping slits slightly anterior to the setal annulus on a common oval tumid area (3 paratypes). Spermathecal pores 2 pairs, on well marked small, hemispheroidal papillae anteriorly in VIII and IX, nearer 7/8 and 8/9 than they are to the setal annulus, in *a* lines (holotype and 4 paratypes).

The holotype and paratype QMG211421 were dissected for internal anatomy. Dorsal blood vessel single, continuous onto the pharynx. Last hearts in XIII; hearts in X-XIII each arising in common with a latero-oesophageal vessel from a short common lateral vessel from the dorsal vessel. No hearts recognized in VIII and IX in which the latero-oesophageal vessel encircling the calciferous glands is also much less developed than in X-XIII. Gizzard very large, firmly muscular, in V, cylindrical but slightly tapering posteriad, deflecting septa 5/6 and 6/7 posteriorly. Calciferous glands very large, paired in VIII-XIII (6 pairs), each reniform and well demarcated from the oesophagus which it joins only at its hilus. Intestine commencing with abrupt expansion in XVI. Typhlosole dorsal, low in XVI, well developed in XVII and by XVIII becoming a very large inverted T-shaped structure. Nephridia meronephridia; large tufts anterior to the gizzard but lying in V discharge by wide ducts into the pharynx; in the oesophageal region and anterior intestinal region many stomate avesiculate micromeronephridia; caudally with several preseptal nephrostomes and a very conspicuous longitudinal urcter which is situated dorsally to the dorsal blood vessel and continues posteriorly; it is not traceable to its termination in the holotype which is a posterior amputee but in the paratype appears to enter the intestine about 25 segments from the anus. Iridescent sperm funnels in X and XI; seminal vesicles compact and racemose, in XII only. Ovaries small, palmate, in XIV. Prostates elongate racemose, the gland in XVIII and XIX, with distally widening muscular curved or straight duct; vas deferens running up the duct to join the junction of gland and duct. A large subspheroidal firm mass, presumably glandular or glandulomuscular, corresponding with each of the paired accessory genital markings and with the large midventral marking. Spermathecae 2 pairs, in VIII and IX; each with a narrow pyriform ampulla, a short, digitiform diverticulum (uninseminated in the holotype; with iridescent sperm masses in the paratype), and a moderately slender fairly muscular duct.

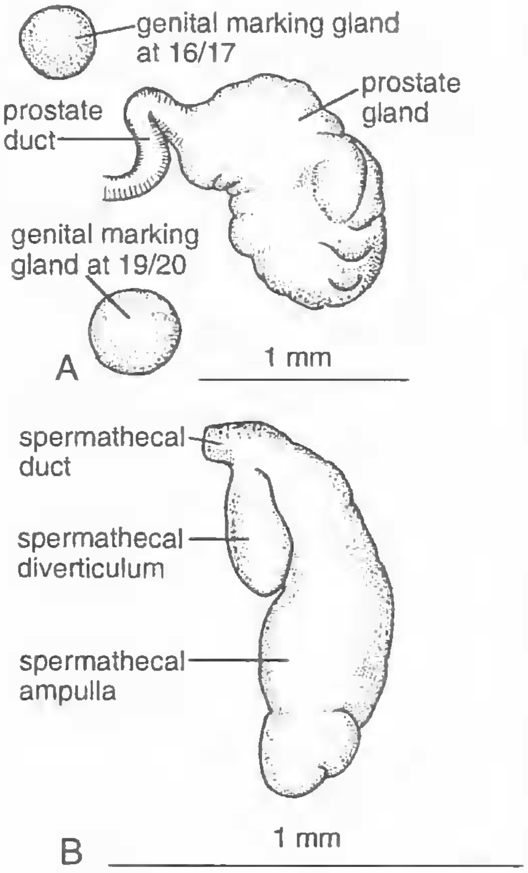
genital marking gland at 16/17
prostate gland
prostate duct
genital marking gland at 19/20
A
1 mm
spermathecal duct
spermathecal diverticulum
spermathecal ampulla
B
1 mm

FIG. 15. *Oreoscolex retrocystis* sp. nov., Holotype, QMG211416. A. right prostate. B, ventral view of right spermatheca of IX.

Etymology

From *retro*, backwards, and *cyst*, a thin-walled hollow organ, alluding to the location of the spermathecal pores behind rather than in the intersegmental furrows.

Remarks

Oreoscolex retrocystis resembles *O. saccarius*, in addition to their general *Oreoscolex* characters, in having the first dorsal pore in 10/11; intersegmental accessory genital markings; 2 pairs of spermathecal pores on small protuberances; 6 pairs of reniform calciferous glands, in VIII-XIII; and last hearts in XIII. It agrees with the type species, *O. imparicystis*, in having segmentally located spermathecal pores (there posterior in VII and VIII) and in having seminal vesicles in XII only. It differs from all other *Oreoscolex* species, and, indeed, all known oligochaetes, in the configuration of the genital markings.

Propheretima gen. nov.

Type Species

Propheretima eungella sp. nov.

Diagnosis

Perichaetine; setae numerous per segment; a few present between the male pores. Female pore single, midventral (or sometimes, *P. hugalli*, paired but very close together?). Clitellum limited to XIV-XVI. Gizzard in V. Calciferous glands present or absent. Intestinal caeca absent. Testes in X and XI.

Description

Peristomium ventrally bisected or not. Dorsal pores present. Setae numerous in setigerous segments; a few present between the male pores. Clitellum annular, XIV-XVI. Male pores in XVIII; porophores typically but not always preceded and succeeded by an intrasegmental crescentic groove. Intrasegmental accessory genital markings present or (if immature?) absent. Female pore unpaired (typically) or paired. Dorsal blood vessel single. Last hearts in XII or XIII. Gizzard in V. Calciferous glands present or absent. Meronephric, typically with intrasegmental funnels. Enteronephry unknown. Holandric; seminal vesicles in IX and XII or IX, X, XI and XII. Prostates tubuloracemose or racemose (single lobed). Ovaries in XIII. Spermathecae each with a single diverticulum.

Etymology

Propheretima, referring to an apparent plesiomorphic relationship to *Pheretima* sensu lato.

Other Species

Propheretima (= *Megascolex*) *fuscus* (Michaelsen, 1916). Queensland.

Propheretima hugalli sp. nov. New South Wales.

Species Incertae Sedis

Propheretima (=*Megascolex*) *heterochaeta*. Queensland.

Propheretima (= *Perichaeta*) *newcombei* (Beddard, 1887). Queensland.

REMARKS

Jamieson (1977) drew attention to the likelihood that the great oriental assemblage of species in the genus *Pheretima* sensu lato, which now includes the Australo-Papuan genus *Begemius* Easton, had its ancestry in Australia. It was suggested that the Australian genus *Spenceriella* was the nearest known extant relative of *Pheretima*. The species here placed in the new genus *Propheretima* fall within the definition of *Spenceriella* given by Jamieson (1972) and Jamieson & Wampler (1979). However, they are distinguished from other species placed in *Spenceriella* by a combination of characters: presence of setae between the male pores, restriction of the clitellum to segments XIV-XVI, and, typically, a single female pore, all of which are features of *Pheretima* sensu lato. They differ from *Pheretima* sensu lato in having the gizzard in segment V, not the apomorphic location in VIII, and in at least as many features as separate the various genera now recognized within that assemblage. Within *Propheretima*, the type species, *Propheretima eungella* and *P. fuscus* appear to be closely related, sharing crescentic grooves which bound the male porophores anteriorly and posteriorly.

P. hugalli is placed in *Propheretima* because it has the clitellum restricted to XIV-XVI and setae, albeit only setae *a* and *b*, between the male pores. It differs from *P. eungella* in apparent pairing of the female pores, though that they are not medianly fused requires confirmation from further material.

Placement of *P. heterochaeta* and *P. newcombei* in *Propheretima* is uncertain. *P. newcombei* is included because it has a single female pore and appears from an illustration by Beddard (1887) to have setae between the male pores. However, if Beddard's account is correct, it is unique in the Megascolecidae in location of the gizzard in IV, V and VI which retain their intervening, rather delicate septa. The species is inadequately described, the types have been lost and the author has been unable to collect it in the type or other localities. Gates (1965) synonymy of the New Zealand *Megascolex laingi* Benham in *M. newcombei* is not here accepted.

P. heterochaeta is here included in *Propheretima* chiefly because Michaelsen (1916) considered this species to be near *Megascolex* (here *Propheretima*) *newcombei* which differed in the form of the accessory genital markings. Inclusion in *Spenceriella* is contraindicated by the large setal numbers (68 in segment 50), intestine beginning in XVII (XV or XVI in *Spenceriella*), and location of seminal vesicles in X and XI (in addition to IX and XII). Details of the meronephridia are not known. Because of the immature state of the types, the generic placement of this species, and indeed its specific characteristics, remain uncertain.

KEY TO THE SPECIES OF *PROPHERETIMA*

1. Each male porophore immediately preceded and succeeded by an intrasegmental crescentic groove 2
Each male porophore not immediately preceded and succeeded by an intrasegmental crescentic groove 3

2. Genital markings on X, XVII-XX. Three pairs of well developed sessile calciferous glands in X-XIII . . . . *P. eungella*
No preclitellar genital markings (immature?). [A slightly raised transverse field may be present midventrally in XVIII, and also posteriorly in XVII and anteriorly in XIX]. Calciferous glands absent . . . . *P. fuscus*

3. Each male porophore preceded and succeeded, at the intersegment and slightly more medianly, by a puckered pit. A pair of transverse pads equatorially in X with a small presetal, pore-like depression . . . . *P. hugalli*
Each male porophore not preceded and succeeded by a puckered intersegmental pit. Genital markings not as 3(1) 4

4. Prostomium epilobous. Genital markings not definitely developed . . . . *P. heterochaeta*
Prostomium prolobous. Preclitellar genital markings present to as far forward as VII. [Genital markings very variable. When most numerous: segment XIII with a single, midventral papilla; XI and XII each with three papillae close together, one median and one on each side of this; X with four papillae, of which the middle ones correspond in position to the median papillae of the two succeeding segments; IX with a single papilla, corresponding in position to the outermost right hand one of segment X, the others being indistinct; VII and VIII each with a single median papilla] . . . . *P. newcombei*

Propheretima eungella sp. nov.

(Figs 16, 17)

MATERIAL EXAMINED

HOLOTYPE: QMG211434 (clitellate). All specimens from 21°08'S, 148°30'E, Eungella National Park, Palm circuit, Qld., in a rotting log. Collectors A. Postle and G. Dyne, 13.Jun.1974-Qld.

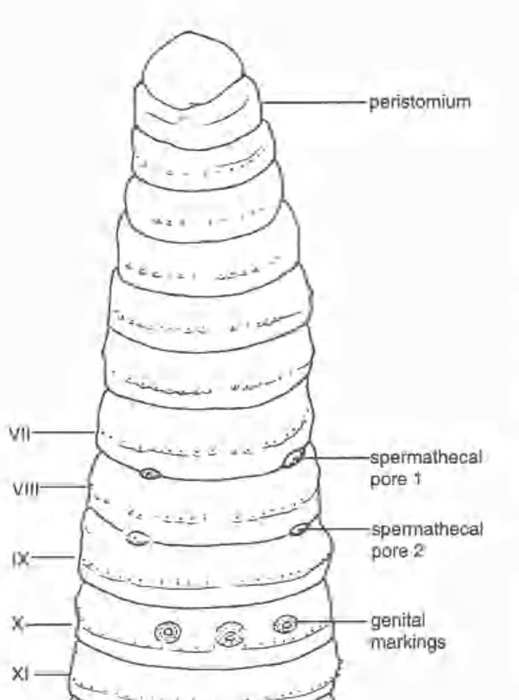

FIG. 16. *Propheretima eungella* sp. nov., Holotype, QMG211434. Forebody and clitellar region.

DESCRIPTION

Length 61mm, width 3.7mm, segments 93. Colour in ethanol dorsally dark steel grey; pale ventrally; clitellum buff. Prostomium epilobous 1/2. Peristomium not ventrally bisected. First dorsal pore 4/5. Setae in XII, 34; *aa:ab:bc:cd:yz:zz* = 1.8:1.0:0.8:0.8:1.6:2.8; dorsal break small but appreciable in the forebody, caudally not appreciable and ventral break scarcely greater than adjacent setal intervals; about 12 segments from the posterior extremity 60 setae per segment; a few present between the male pores. Clitellum annular, XIV-XVI. Male pores narrow elongate slits on two large, transversely oval porophores in XVIII, with centres in *cd*, in the setal arc, each porophore bordered anteriorly and posteriorly by a crescentic glandular depression. Accessory genital markings: eyelike markings consisting of a central small transversely oval papilla and a dark glandular field with a white rim, not noticeably raised, a pair presetally in *cd* and one median in X; in XVII a presetal, medianly conjoined pair with centres just lateral of *b*, and a postsetal pair in *d* lines; in XVIII, minute markings anterolateral and posterolateral to the male porophores, approximately in setal lines 6-7 relative to segment XIX; in XIX a glandular area presetal from *a* to *e* lines, each with two small eyelike markings of which the lateral is the larger; in XX a presetal pair with centres in *b* lines. Female pore unpaired, midventral and presetal in XIV. Spermathecal pores 2 pairs, in intersegmental furrows 7/8 and 8/9, in setal lines 5-6, on small papillae.

Dorsal blood vessel single. Last hearts in XII. A large, moderately compressible gizzard in V. Three pairs of well defined subspheroidal calciferous glands in X, XI and XII, each sessile but well constricted off from the oesophagus; the lumen of each gland with many radial vascularized laminae almost meeting centrally. Intestine commencing with abrupt expansion at the anterior septum of XVI. Loose aggregates of meronephridia in the pharyngeal region send a large duct forwards to the vicinity of the peristomium but no enteronephry detected. Caudally with 10 or more meronephridia on each side of which some at least have a long-stalked, intrasegmental, posteriorly directed minute funnel. A single, larger preseptal funnel present on each side medianly; no enteronephry demonstrated. Free testes and iridescent funnels in X and XI; very large racemose, much subdivided seminal vesicles with large loculi and clusters of many minute spheroidal bodies, paired in IX and XII. Prostates tubuloracemose, restricted to XVIII; superficially racemose lobes but resolvable into a flattened S-shaped structure with three continuous adpressed sections; each gland with a stout looped muscular duct. Ovaries a pair in XIII, each a large mass of many oocytes with multiple stalks

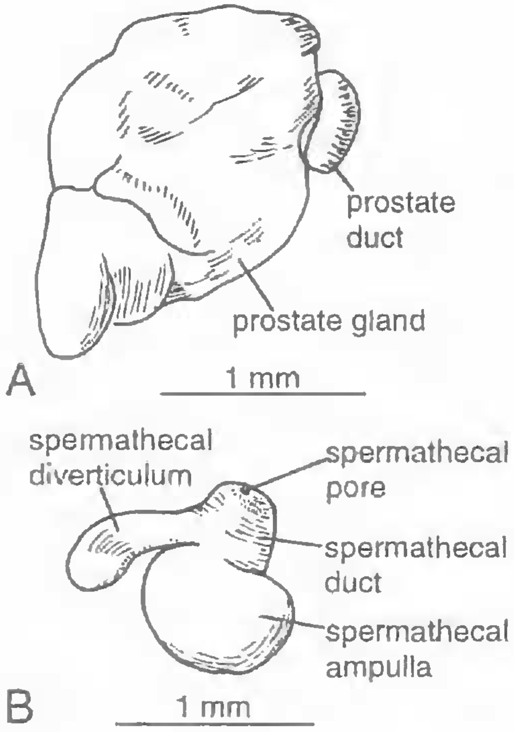

FIG. 17. *Propheretima eungella* sp. nov., Holotype, QMG211434. A, right prostate gland. B, right posterior spermatheca.

to the anterior septum; a pair of large funnels on the posterior septum. Spermathecae 2 pairs in VIII and IX, each discharging at the anterior intersegment; each with a large transversely ovoidal ampulla, a bulbous inseminated diverticulum of approximately equal length, and a short wide duct.

ETYMOLOGY

From Eungella National Park.

REMARKS

Propheretima eungella resembles only *P. fuscus*, in the genus, in having a crescentic groove bordering each male porophore anteriorly and posteriorly but differs from the latter species, and all other members of the genus, in having genital markings on X, XVII-XX and three pairs of well developed sessile calciferous glands in X-XIII.

Propheretima hugalli sp. nov.
(Figs 18, 19)

MATERIAL EXAMINED

HOLOTYPE: QMG211452. From c. 28°49'S, 153°16'E, Lismore, Boat Harbour, NSW. Collector A. Hugall. 12 Aug. 1994.

DESCRIPTION

Length unknown, width (midclitellar) 2.4mm, number of segments unknown. Colour in ethanol pinkish purple, paler ventrally in the postclitellar region. Prostomium closed epilobous 1/3. Peristomium very short, bisected ventrally. Body not canaliculate. First dorsal pore 6/7. Setae perichaetine, 30 in XII; in the forebody, dorsal (*zz*) and ventral (*aa*) breaks small but just appreciable relative to adjacent intervals; ventral break wider behind the clitellum; caudally *zz* and *aa* remain narrow and *z* line is irregular. Setae *a* and *b* present between the male porophores. Clitellum annular, XIV-XVI; strongly demarcated and protuberant; setae, dorsal pores and intersegments obscured. Male pores in *c* lines towards the median aspect of a pair of large oval porophores which are well demarcated medianly but not laterally and which almost fill XVIII anteroposteriorly. Each porophore preceded and succeeded, slightly more medianly, by a roughly oval depression, in posterior XVII and anterior XIX, with puckered anterior or posterior margins respectively; these depressed genital markings continuous with a relatively depressed area between the porophores. Other genital markings consist of a pair of poorly defined transverse pads equatorially in X which fill the segment longitudinally; each with a small pore-like depression in the setal arc, in *c* lines. A small transverse elevation in XIV appears to bear a pair of female pores very close together but pairing requires confirmation. Spermathecal pores 2 pairs, in 7/8 and 8/9, only the posterior left pore visible, in *d* line.

Dorsal blood vessel single. Last hearts in XII. Gizzard small, soft, virtually vestigial, in V with slight muscular sheen which is also seen on the slightly narrower oesophagus in IV and anterior VI. Oesophagus also whitish in VII; vascularized and intersegmentally constricted in VIII to XIII; in XI, XII and XIII with a dorsal longitudinal groove giving some appearance of extramural calciferous glands and in these segments with high internal rugae but not constricted off from the oesophageal lumen. Intestine commencing in XVI. Nephridia avesiculate micromeronephridia; no funnels definitely present in the forebody and clitellar regions; some loose tufting or aggrega-

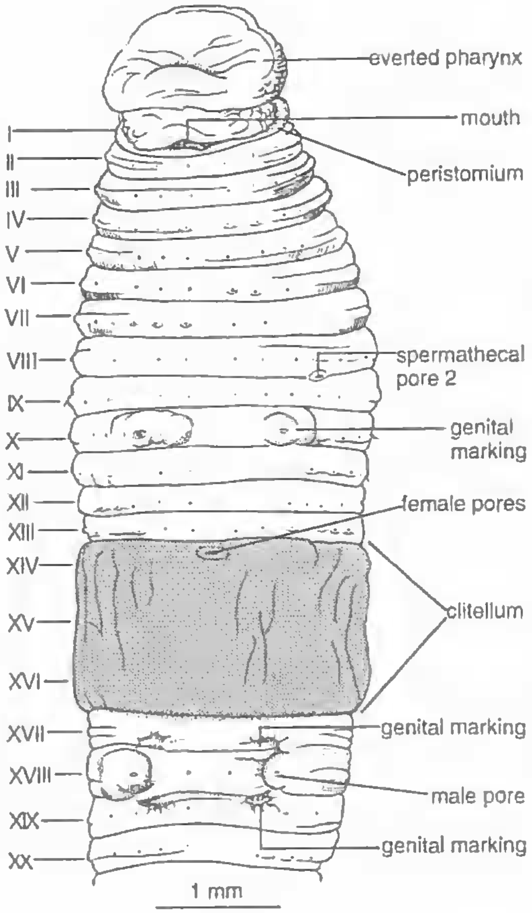

FIG. 18. *Propheretima hugalli* sp. nov., Holotype, QMG211452. Ventral view of forebody and clitellar region.

tion anteriorly; caudally tending to form lateral aggregations and with occasional intrasegmental funnels observed; presence or absence of median preseptal funnel not demonstrable; no enteronephry observed but absence requires confirmation. Free sperm masses and very large, convoluted iridescent funnels in X and XI; seminal vesicles racemose, in IX and XII. Prostates restricted to XVIII; each a tongue-like lobe with a minutely papillate surface indicative of racemose structure; the short narrow medianly directed duct joined entally by the conjoined vasa deferentia. Ovaries a pair in XIII, each a relatively large folded lamina with many chains of large oocytes with multiple stalks to the anterior septum; a pair of funnels on the posterior septum with ducts entering the body wall independently but close together. Spermathecae 2 pairs in VIII and IX, discharging at the anterior intersegments; each with a narrow bulbous ampulla, and a similarly shaped smaller diverticulum which is about two thirds the length of the spermatheca.

ETYMOLOGY

For Andrew Hugall, the collector.

REMARKS

Propheretima hugalli differs from the other species of the genus in having an intersegmental puckered pit anterior to and behind each male porophore and a pair of transverse pads equatorially in X with a small presetal, pore-like depression.

Spenceriella conondalei sp nov.
(Figs 20, 21)

MATERIAL EXAMINED

HOLOTYPE: QMG211422 (ex QMG1158).
PARATYPES: QMG211423-33, 10 clitellate specimens, all from 26°45'S, 152°37'E, Conondale Range, Qld., in leaf litter. Collected R. Raven, 13-18 May 1976.

DESCRIPTION

Length 26-40mm, mean 33mm. Width 2.2mm. Segments 81-109, mean 92 (n=4). Pigmentless buff in ethanol. Prostomium epilobous 1/2. First dorsal pore 5/6. Setae 18 in III; 30 in XII; 32 in XX; about 26 in caudal segments (H); *aa:ab:bc:*

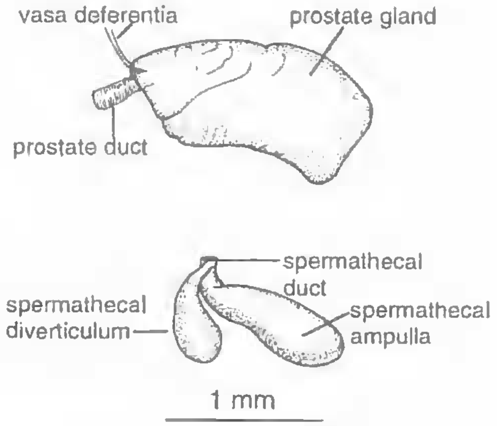

FIG. 19. *Propheretima hugalli* sp. nov., Holotype, QMG211452. A, right prostate. B, right posterior spermatheca.

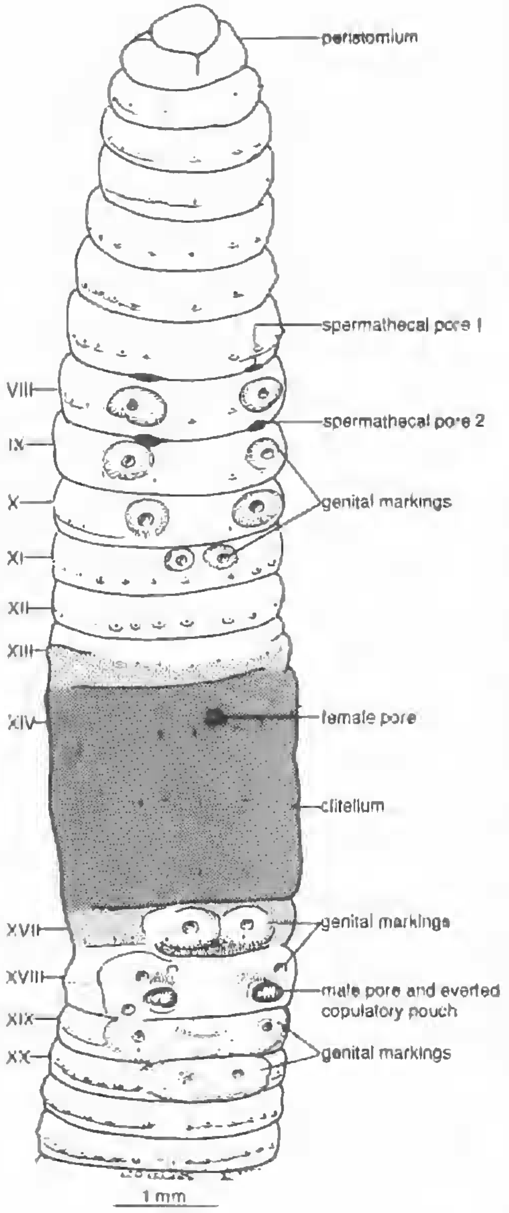

FIG. 20. *Spenceriella conondalei* sp. nov., Holotype, QMG211422. Ventral view of forebody and clitellar region.

cd:yz:zz = 1.6:1.0:0.5:0.5:0.5:1.0; dorsal and ventral breaks not apparent; possible vestiges of two setae, represented only by pore-like dimples, between the male pores; setae *a* sometimes absent in the vicinity of the genital markings, in segments VIII-X. Clitellum annular, best developed on XIV-XVI but some development without tumescence in 1/2XIII, 1/2XIII and XVII. Male pores large orifices centred in *b* lines of XVIII, each occupied by a strongly protuberant, whitish everted copulatory pouch. Genital markings paired, each consisting of a low whitish subcircular to elliptical mound, with presetal pore-like centre; in VIII with the centre in *bc*; in IX immediately median of *c*; in X in or very slightly lateral of *b*; in XI in the immediate vicinity of *a* line; in XVII, in *ab* and in contact with its partner medianly; in XIX, in or immediately lateral of *b*; in XX, in or immediately lateral of *a*; the markings on XIX and XX, but not their pore-like regions, fused across the midline in each segment to form a single midventral pad; on XVIII a tumid area, extends laterally to about setae 5, and bears a pair of small pore-like markings anterolateral and another posterolateral to the male pores, lateral of *c*, sometimes with an additional pore anteromedian to the male pore. Some markings, particularly in VIII and/or XVIII, may be absent or unilateral in clitellate specimens. Female pore single, midventral, shortly anterior to the setal arc in XIV surrounded by a small elliptical field. Spermathecal pores transverse slits with thin white elliptical lips, in 7/8 and 8/9, their median borders in or immediately lateral of *b* lines

Dorsal blood vessel single. Last hearts in XIII. Gizzard moderately large, cylindrical and firmly muscular, in V but deflecting septum 5/6 posteriorly so as to end posteriorly in VIII relative to external segmentation. Calciferous glands absent but oesophagus vascularized and with an encircling blood vessel on each side in each of segments VIII-XIII. Intestine commencing in XV; with a low lobulated and not uniformly continuous dorsal ridge but no definite typhlosole; caeca absent; intestinal contents include quartz grains and pieces of wood. Several large meronephridial tufts anterior to the spermathecae, some with ducts to the pharynx, others exonephric. Several apparently astomate meronephridia on each side in anterior intestinal segments. Caudally with a median preseptal funnel and apparently some intrasegmental funnels though the latter were not demonstrable in some specimens. Testes and large iridescent funnels free in X and XI. Large racemose seminal vesicles in IX and XII. Ovaries conspicuous bunches of oocytes in XIII. Prostates racemose, flattened, subrectangular with a small accessory lobe behind the junction with the curved muscular duct. Spermathecae 2 pairs, in VIII and IX, each with a subspheroidal ampulla

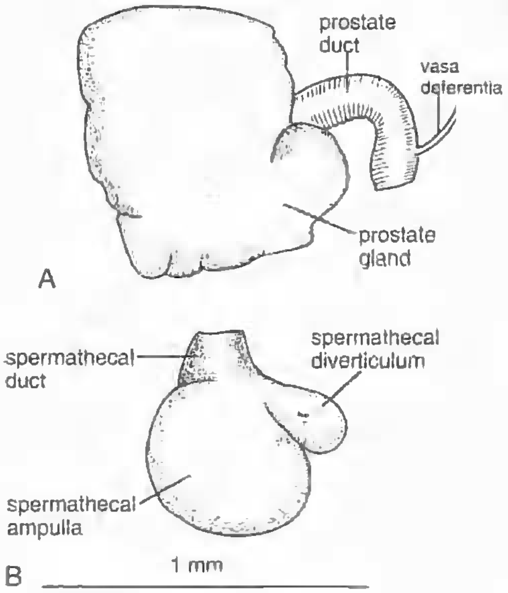

FIG. 21. *Spenceriella conondalei* sp. nov., Holotype, QMG211422. A, left prostate. B, right posterior spermatheca.

and a small, iridescent and therefore inseminated, clavate diverticulum.

ETYMOLOGY

For the type locality.

REMARKS

S. conondalei is exceptional in *Spenceriella* in having a single, not paired, female pore. The presence of questionable vestiges, as minute pits, of two setae between the male pores is therefore noteworthy in view of diagnosis of *Propheretima* and *Pheretima* sensu lato by the presence of well developed setae between the male pores. *S. conondalei* is excluded from both of these genera because of the absence of recognizable setae at these loci and because of its general similarity to *Spenceriella*. The well developed gizzard places it in the subgenus *Spenceriella* although the absence of calciferous glands is not typical of that subgenus.

DISCUSSION

The present study has added to the endemic earthworm fauna of Australia (Megascolecidae), one species of Acanthodrilinae (*Rhododrilus glandifera*) and nine species of Megascolecinae, in the tribes Perionychini (*Heteroporodrilus montiserratae*, *Terrisswalkerius windsori*, *Cryptodrilus bunyaensis*); Dichogastrini (*Digaster lingi*, *D. moretonensis*); and Megascolecini (*Oreoscolex retrocystis*, *Propheretima eungella* gen et sp. nov., *Propheretima hugalli*, and *Spenceriella conondalei*). *Rhododrilus glandifera* is the second species of this primarily New Zealand genus to be described from Australia. It is possible that it has acquired the microscolecin arrangement of male pores (prostates one pair discharging with the vasa deferentia in XVII) from a precursor with the acanthodrilin arrangement (prostate pores 2 pairs, in XVII and XIX; male pores in XVIII) independently of the New Zealand species. If this were so, retention in *Rhododrilus* could not be supported and separate, new generic status would be required.

The type localities of *Heteroporodrilus montiserratae*, *Terrisswalkerius windsori*, *Digaster lingi*, *D. moretonensis*, *Oreoscolex retrocystis* and *Spenceriella conondalei* are well within the ranges of their respective genera. However, the insular locality of *D. moretonensis*, on Moreton Island, is of zoogeographic interest and *Cryptodrilus bunyaensis* represents a northern extension for its genus. The new genus *Propheretima*, has been erected for species which resemble the Oriental and Australo-Papuan *Pheretima* sensu lato assemblage of genera in having setae between the male pores but which are plesiomophic in retaining the gizzard in segment V, not in the apomorphic location of VIII seen in all pheretimas. It endorses the author's view (Jamieson, 1977) that the ancestry of the *Pheretima* assemblage may have lain in Australia.

ACKNOWLEDGEMENTS

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